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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/837,265	04/19/2001	Kenneth H. Church	CMS	7911

7590

07/18/2003

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EXAMINER

FULLER, ERIC B

ART UNIT

PAPER NUMBER

1762

DATE MAILED: 07/18/2003

13

Please find below and/or attached an Office communication concerning this application or proceeding.

4213

# Office Action Summary

Application No.

09/837,265

Applicant(s)

CHURCH ET AL.

Examiner

Eric B Fuller

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6-46 is/are pending in the application.
- 4a) Of the above claim(s) 29-42 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-28 and 43-46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-4, 6-10, 12-15, 21, and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Wadman (US 6,451,387 B1).

Wadman teaches a process where ceramic powder is applied to a low temperature substrate (abstract). A pulsed laser is used in order to compact the powder and sinter it to the substrate (column 1, lines 45-67). The depth (heating) of the laser is controlled (column 2, lines 43-67). The laser may heat the top of the coating layer or the substrate, or both (column 3, lines 1-8). When the laser is used to heat the substrate at the interface such that the substrate heats the coating layer (column 3, lines 1-7; column 4, lines 15-29), the temperature between the substrate and the coating material at the interface is inherently similar. When the laser heats the ceramic layer only, such that the coating has a different temperature than the substrate, the particles are sintered together and the adhesion to the substrate is unaffected (column

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2, lines 43-67; column 3, lines 1-8). Optimizing the pulse duration of the laser by minimizing it and defining the penetration depth controls the diffusion of heat and keeps the substrate from being damaged (column 1, lines 55-67). The effects of claim 22 are considered inherent as the materials and process steps of the claimed invention and the cited reference are the same.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11, 16, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wadman (US 6,451,387 B1).

As to claim 11, the reference teaches to use low energy per pulse and short pulse durations. The reference is silent to the peak power being in the gigawatt range. However, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to use peak powers sufficient enough to sinter the coating material without causing damage to the substrate. To determine what this value is would be within the skill of one practicing in the art through routine experimentation.

As to claim 16, Wadman fails to teach to monitor the behavior of the heat in the material. However, to do so would have been obvious to one skilled in the art in order to achieve uniformity and reproducibility of multiple applications of the process. A

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thermal-imaging camera, being known in the art, would have been an obvious way to do this.

As to claim 23, to have a feedback control system would also have been obvious at the time the invention was made to a person having ordinary skill in the art in order to ensure reproducibility of the process.

Claims 17, 18, and 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wadman (6,451,387 B1), as applied to claim 1 above, and further in view of Ladd et al. (US 6,100,463).

Wadman teaches the limitations of claim 1. The references fail to teach the use of a thermal barrier layer over the substrate in order to protect the substrate from the heat associated with sintering. However, Ladd teaches that aerogels are used as spacer materials when thermally isolating portions of a semiconductor wafer (column 4, lines 15-30). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize aerogel, as a thermal barrier, to protect the substrate from damage from the heat produced by the sintering process. Since the materials in the reference are the same as that claimed by the applicant, it is the examiner's position that it is inherent that the aerogel also acts to increase adhesion of the sintered material.

Claims 19, 20, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wadman (US 6,451,387 B1) in view of Kirkpatrick (US 4,151,008).

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Wadman teaches a sintering process for increasing the adhesion of a coating material to a substrate where the substrate has a lower melting temperature than the coating material to be sintered, such that the substrate is not damaged. The reference fails to teach the product is an electronic component. However, Kirkpatrick teaches that semiconductor devices are made by sintering metal-semiconductor interfaces (column 5, lines 55-60). As the substrate in this case has a lower melting point than the coating, it would have been obvious to use such material in the process of Wadman. By doing so, one would reap the benefits of producing the semiconductor device without damaging the substrate.

Claims 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wadman (US 6,451,387 B1), as applied to claim 23 above, and further in view of Kriegel et al. (US 6,300,256 B1).

Wadman teaches or makes obvious the limitations of claim 23. Specifically, the limitations of claim 22 are implicitly or inherently taught and the limitations of claim 23, the use of a feedback controller, would have been obvious in order to achieve reproducibility of the process. The reference fails to teach the use of a pyrometer in order to provide the input of the feedback controller. However, one skilled in the art would recognize that a temperature would be the desired input for the controller as it is taught that temperature control is crucial to the sintering process. Additionally, Kriegel teaches using a pyrometer to determine the temperature of a semiconductor (column 12, lines 5-10). This is done to ultimately control the temperature and temperature

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gradients of the semiconductor. The benefit of the pyrometer is that the temperature can be determined without contacting the substrate (column 3, lines 35-37). Therefore, it would have been obvious at the time the invention was made to a person having ordinary skill in the art to utilize the pyrometer in order to determine the temperatures at selected areas of the semiconductor without making any contact that might disturb the system.

To have the pyrometer connected to a computer that controls the parameters of the laser would have been obvious to one skilled in the art. It is the examiner's position that the control loop would inherently have to be either open or closed. To provide an interface for real time use by end users, such as to CAD software, would also have been obvious to one skilled in the art such that full automation can be achieved and design changes are instantaneously performed.

### ***Response to Arguments***

Applicant argues that the process of Wadman causes a thermal gradient and thus fails to read on maintaining a similar temperature between the substrate and the material. This is not found convincing. It is explicitly taught that the surface of the substrate is heated with the laser set at wavelengths that heat the substrate and the substrate heats the coating material. Therefore, since the substrate is receiving the heat and is heating the coating material, the temperature of the substrate *at the interface* and the temperature of the coating material *at the interface* would inherently be "similar". As the applicant has admitted that a temperature "gradient" is formed, and



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a gradient is defined as a "progressive change" this reads on the temperatures of the substrate and the coating material *at the interface* being "similar". The temperatures being similar at the interface is sufficient for reading on the applicant's claim of "maintaining a similar temperature between the substrate and the material".

All other arguments are moot in view of the new grounds of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B Fuller whose telephone number is (703) 308-6544. The examiner can normally be reached on Mondays through Thursdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck, can be reached at (703) 308-2333. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



EBF  
July 15, 2003



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SUPERVISORY PATENT EXAMINER  
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